

The ultra high dilutions and its virtual structures

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Zusammenfassung

Nach Analyse mehrerer experimenteller Grundlagen-Arbeiten in der Diskussion um den Wirkungsmechanismus homöopathischer Medikamente, wurde hier die Quanten-Mechanik als beste Diskussions-Basis auf diesem Gebiet gewählt. So präsentieren wir eine mathematische Diskussion verschiedener Gleichungen, die einen möglichen Mechanismus innerhalb der Relation "Gelöster Stoff – Lösungsmittel" beschreiben.

Schlüsselwörter: Ultra-Dilution, Virtuelle Quantenstrukturen

Summary

After analysis of several experimental works in search for subsidies which would allow a discussion on the action of homeopathic medicines, the Quantum Mechanics can be chosen as the most appropriate tool for the discussion on this subject. Thus, it is presented a mathematical discussion based in this area, comprising different equations to propose a possible mechanism in the relation solute – solvent.

Key words: ultra dilutions, virtual quantum structure

Después del análisis de varios trabajos experimentales en búsqueda de subsidios que permitirían una discusión acerca de la acción de los remedios homeopáticos, la mecánica cuántica puede escogerse como la herramienta más apropiada para la discusión en este asunto. Así, se presenta una discusión matemática basada en este área y comprende diferentes ecuaciones para proponer un posible mecanismo en el relación solute - solvente.

Palabras clave: ultra diluciones, estructura virtual cuantica

Introduction

Homeopathy, developed by Samuel Hahnemann [1755-1843], is a medical practice that is quite spread all over the world and which has suffered criticism and disapproval through all its history. A branch of medicine, homeopathy has also been significantly affected by the paradigm change introduced into science by modern physics, ultra dilutions, particularly, as homeopathy lacks a conceptual model that explains all clinic results ever obtained, as well as justify the functionality of high dilutions in an objective and scientific way.

Due to its own conceptual and experimental characteristics, homeopathy cannot be classified as a branch of allopathy. It is necessary to define new scientific and conceptual bases for its accurate understanding and study, taking into consideration the advances of quantum mechanics, the systemic view and some aspects of psychology.

Recently, a vast number of experiments showing the biological effects of high dilutions have appeared in indexed magazines and were cited in bibliographical revisions(1).

In 1996, an European Parliament committee concluded, after meticulous studies carried out in research centres, that homeopathy is a reality, including when high dilutions are used, and recommended investigations to identify its action mechanisms(2-3)

Using mathematical models Del Giudice et al speculate if the natural electromagnetic field of a substance in solution could generate some coherence domain in the solvent, which would be specific for the mentioned substance, with spatial and time stability. Thus, water organization would be a dynamic process associated to electromagnetic interactions of very low intensity: molecules with similar electromagnetic frequencies could attract one another in a self-catalytic process rather than at random. Del Giudice makes it clear that such speculation does not explain the phenomenon of the ultra dilutions, but suggests a new direction for future studies. (1)

Recent experiments have strongly indicated that perturbations which do not observe the scientific parameters of matter in the positivistic sense of the word do occur in ultra diluted mixtures, which leads us to consider the existence of quantum-mechanical conceptual forces operating on matter and producing conditioning perturbations in it.(4-7)

Toxicological homeopathy can, as a rule, proceed in two different ways: through the principle of inversion effects in specially prepared dilutions, or through information transference processes of biophysical properties. According to several researchers, none of the original molecules would remain in ultra diluted solutions to exert biological effect, indicating that bio-molecular information might be transferred via water. (8-14)

Recent studies reveal that the water dipole may develop a coherent oscillation phase through radiation coupling [4-5]. It has been proposed that this would be modulated, like the pattern of an ordered period of signals, and could induce propagation of coherent waves in metals [11, 14]. An additional theory suggests that the coherent oscillation phase can originate information patterns through isotopic effects in high dilutions [14].

Classical physics inability to explain several phenomena convincingly made necessary a search for new ways to understand the reality of nature.

Old classical physics still survives in the realm of the real world, but as a special case of the new physics, *i.e.*, quantum mechanics is valid in the domain of classical physics, but classical physics isn't valid in the entire domain of quantum mechanics(23).

The principle of correspondence notwithstanding, the new physics' paradigm goes against the precepts of materialistic realism. Such conclusion is unavoidable, since quantum-mechanical paradoxes not explained by classical physics exist even in macrostructures(7).

Positivistic scientists reluctantly concede that quantum-mechanical objects maintain nonlocal correlations. The fundamental process of nature resides outside of space-time, but generates events that may be located within it(32).

Alterations in the basilar principles ultimately affect medical science, as well. Conventional theory holds that synaptic transmission must be caused by chemical changes. Proof, however, is somewhat circumstantial and E. Harris Walker has contested it, preferring a quantum-mechanical effect instead:

"The synaptic cleft (the region where one neuron joins another) is so narrow that the quantum-mechanical tunneling effect may perform a crucial role in the transmission of nervous signals."(19)

Furthermore, quantum field theory (QFT) has made possible a recent study about information transmission in the microtubules of the brain, in which the authors state that "after taking under consideration the propagation of electromagnetic waves in permanent dipole fluids, the problem was reduced to a sine-Gordon equation with one spatial dimension and one temporal dimension."(29)

Thus, it has been suggested that the use of Quantum mechanics in the present context can lead to sensible results (31).

Homeopathic medicines dynamized to 10^{60} have presented excellent clinical performance, which makes us suppose that impregnations promoted by ultra dilutions of the solute in the solvent carry information about the solute's active principle. If this was not true, symptoms compatible with clinical results would not be observed.[15-17].

These marks or "residual impregnations" in the solvent, in Smith's point of view, affect their spin angles, that is, these little changes in the spin angles end up revealing the presence of mass, momentum or informational wave functions of the impregnating substance present in their vicinities. [29].

The action of the solute upon the solvent actually presents characteristics of a mark or coherent signal, but they are formed by n wave functions of the solute which generate this signal.

This paper introduces a few different concepts about the current biological model, as we see the human body as complex biological systems in dynamic interaction with several interpenetrating fields of organizational forces (*vital force*, in the classic homeopathic description) *i.e.*, it would be like looking at the human body as a complex net of force fields in contact with the physical and cellular systems. The healing, by this process, is based on the action of specific forces, which by operating via resonance, act positively in the body energetic dynamics promoting its reestablishment.

Based on quantum mechanics and experimental evidence observed by a number of scientists all over the world, this study is aimed at redefining some biological concepts which still remain sustained in the old classical physics.

Methodology

Some premises were adopted as a starting point, as our objective is to propose a new theoretical model, Quantum Virtual Structure (QVS), directly related to “corporative” (interstructured) activities through which we have tried to justify the functionality of ultra dilutions.

The premises adopted in this paper can be summarized as follows: firstly homeopathy is no placebo [1-5, 15-17, 29]. In the ultra high dilutions the natural electromagnetic field of a substance in a solution could generate “coherence domains” in the solvent[4-5]. These domains could impose changing patterns on the solvent; for the reason that the biological being is formed of matter, it is submitted to the laws of quantum mechanic. [7,18-19]. We have adopted the concept of open system from complex systems’ theories. Biological information received by the body exert a role of biological significance bound to generate physiological modifications after its elaboration by the organism [15]. Non-local correlations in biological systems were assumed. [16, 20-21]. Considering the premises adopted above we suggest the existence of QVS, which would be responsible for the results obtained in high dilutions.

Discussion

QVS Model

The residua of the solute in highly diluted solutions behave as if they still had a solid molecular structure, *i.e.*, they seem to remain bound by a “pseudo binding energy”. That leads us to consider a “virtual” quantum-mechanical model for the solute. The QVS would be described through a wave function that carries the solute’s information.

In quantum mechanics, objects are described in terms wave functions. In this sense, there is a probabilistic component which implies that a molecule has always a non zero probability of being anywhere. If information is added somewhere in a liquid, using a molecule, for example, then there is a wave function describing such information. Let’s suppose that this solution is diluted further. Classically, a perturbative-type wave function could be described, as a first approximation, by a constant function with a certain quantum number, say n , which characterizes the molecule, *i.e.*,

$$\varphi_n(x) = \frac{1}{\sqrt{V}} f_n \quad (1)$$

where V is the volume of the solution, and f_n is a discrete function which does not depend on the position, has a unitary module, and characterizes a generic quantum number n , so that it contains all the phenomenology and physical effects of the curative agent. In quantum theory, the dilution of the solution

implies, basically, in an increase of the V volume above described and the classic wave function will never vanish completely.

If this characterization is possible, the solution will always bear a mark of the quantum number n of the wave φ , no matter how diluted it may be. Moreover, direct communication between all portions of the solution via function wave is possible.

Generally speaking, the standard procedure for modeling solute / solvent systems is based on defining the solvent's wave function as background – much like a dielectric, in classical electrodynamics, or vacuum, in quantum field theory. The solute's interaction with the solvent is given by an effective potential in the solute's Hamiltonian.

The continuous basic model is described through a Hamiltonian that takes into consideration a set of nuclei, which stand for the solute's molecules in the positions $\vec{Q} \equiv \vec{Q}_1 \cdots \vec{Q}_{N_{nuc}}$, with electrons in the positions $\vec{q} \equiv \vec{q}_1 \cdots \vec{q}_{N_e}$. We will also place effective quantum numbers $\vec{n} \equiv \vec{n}_1 \cdots \vec{n}_N$.

Additionally, we will assume an effective Hamiltonian which depends on the \vec{Q} variables in a less crucial way, and which describes free waves in these variables. As a first approximation, the solute can be described through a plane wave immersed in the solution background, with quantum numbers \vec{n}_j and eventually other variables generally named \vec{q} . The Hamiltonian is thus supposed to be:

$$H(\vec{q}; \vec{Q}) = H^0(\vec{q}; \vec{Q}) + v_{int}, \quad (2)$$

where v_{int} stands for the interaction potential of the solute / solvent. All information about the solute is given by Schrödinger's equation [24].

$$H(\vec{q}; \vec{Q})\Psi(\vec{n}; \vec{q}; \vec{Q}) = E\Psi(\vec{n}; \vec{q}; \vec{Q}) \quad (3)$$

The energy eigenstates that satisfy the equation, and their related electronic densities, are essential to figure out the desired chemical properties of the solute / solvent system. The eigenstates can be obtained primarily through mathematical techniques such as the Hartree-Fock approximation and other methods, [25-26].

Since the solute is understood to be highly diluted and contained within a dielectric environment, it makes sense to consider the wave functions related to variables that describe each molecule as a whole, *i.e.* the \vec{Q} variables, to be plane waves. Furthermore, since the solvent is assumed to be water or some other solvent that does not destroy the intrinsic properties of the solute, it also makes sense to consider the wave functions related to variables that describe such properties, \vec{q} and \vec{n} , to be nontrivial.

In this case, the general equation can be applied:

$$\Psi(\vec{n}; \vec{q}; \vec{Q}) = \frac{1}{\sqrt{V}^{N_{el}}} e^{i\vec{k} \cdot \vec{Q}} \psi(\vec{n}; \vec{q}), \quad (4)$$

where V is the total volume, \vec{k} describes the momentum of each molecule, which does not interest us now because of its triviality, and the $\Psi(\vec{n}; \vec{q})$ wave function describes the intrinsic properties of the solute within the solution.

Now, even more important than obtaining the $\Psi(\vec{n}; \vec{q})$ solution is understanding what we are actually describing.

First, it is noted that the function $\Psi(\vec{n}; \vec{q})$ holds all the information about the wave function of the solute. However, the chemical properties become weak in highly diluted solutions since the focus of the chemical analysis of a solution is given by its electronic distribution in the equation:

$$\rho_{el}(\vec{n}; \vec{q}_1; \vec{Q}) = -\int |\Psi(\vec{n}; \vec{q}; \vec{Q})|^2 \prod_2^{N_{el}} d\vec{q}_j, \quad (5)$$

where we are only interested in the charge distribution of the first electron, named electron 1. The expression (4) above has a factor $1/V$. In extremely diluted solutions, this factor tends to zero and, as a matter of fact, the charge distribution annuls itself. However, the solution will always be marked by the initial wave function due to the quantum numbers \vec{n} .

One could wonder if the quantum numbers are able to mark the solution in such a way that it can carry the information contained in the original element.

The next step is obtaining the general solution for the solute / solvent system as a whole. In a preliminary approximation, this may be obtained through the product of both wave functions:

$$\Psi_{tot}(\vec{n}; \vec{q}; \vec{Q}; \vec{x}) = \xi_{solv}(\vec{x}) \times \Psi(\vec{n}; \vec{q}; \vec{Q}) \quad (6)$$

The next problem is defining functions that are independent of the solution volume but which are still dependent on the quantum numbers associated with the solute. This can be achieved through the equation:

$$\omega(\vec{n}; \vec{x}) = \int |\Psi_{tot}(\vec{n}; \vec{q}; \vec{Q}; \vec{x})|^2 \prod_1^{N_{el}} d\vec{q}_j \quad (7)$$

which carries all necessary information about the quantum numbers of the solute, but does not carry information about the charge distribution, which would imply in chemical properties similar to the solute, which is not desirable. Furthermore, as the equation is independent of the solution's volume, it is possible to assume an infinitely large volume, which corresponds to a high dilution.

As we consider the wave function (4), the result is that when this mixture is diluted with more solvent, the vector \vec{k} decreases and the wavelength consequently increases. This is consistent with quantum mechanics, which states that the greater the space where a particle (with boundary conditions of a

box) is, the greater the possible wavelengths. It also means that the wave function is more widely spread and has a farther reach than would be possible with smaller wavelengths. In this case it would be restricted to a smaller area.

Larger wavelengths mean greater probability of penetration through the tunnel effect, which means that the reach of the function will be less restricted.

Conclusions

It is believed that the famed “memory of water” is not exclusive to this element, as shown in the study done by Endler et al.(14), in which information was transferred from an analogical environment to a digital one (a silicon plate) without loss of information.

It was observed that any quantum-mechanical solid structure could be impressed by (perturbative) wave functions as long as resonance occurs.

As for the hypothesis of the occurrence of electromagnetic changes due to the dynamization process, it is highly unlikely given the quantum-mechanical nature of this phenomenon.

One might notice that each solute is characterized by a summation of wave signals, which form a distinctive representative mark. (Furthermore, it could be said that, classically, these wave signals present themselves garbed as matter, therefore joining the world perceived by the senses.)

Homeopathy correlates the *dynamization* (ultra high dilutions alternated by succussions, which consists of steady mechanical perturbations applied to the system) of the active principle in the solution with the *potency* of the medicine, and that seems to make sense since the dynamization process involves dilution and succussion.

Dilution brings about longer wavelengths, thus increasing wave penetration through the tunnel effect (tunneling).

One might dare think the succussion process as a possible mechanism for maintaining homogeneity within the homeopathic solution, which would mean that the quantum-mechanical coherence is dependent on this process.

Experimentally, it is known that, should this process is neglected, the homeopathic medicine does not present its usual functionality.

On account of that, it is believed that the process generates an E_0 (initial energy) in the system (mixture).

The conversion of potential energy into kinetic energy, with its consequent liberation of heat to the environment, reduces the degrees of freedom of the solute/solvent system, as the mixture tends to compensate the loss of heat to the environment through internal structural changes.

Thus, it is possible to consider the equation:

$$H\Psi_t = E\Psi_t$$

$$H_t\Psi_{tot}(\vec{n}, \vec{q}, \vec{Q}, \vec{x}) = E_t\Psi_{tot}(\vec{n}, \vec{q}, \vec{Q}, \vec{x}) \quad (8)$$

in which H_t would be the starting point of this change.

Reproducibility occurs through field similarities (wave functions), which is quite similar to what happens between ultradynamized medicines and homeopathized patients, as we propose in this model.

This model also explains the reason why some dynamizations (of a specific active principle) are more effective than others, or even how the concept of “single medicine” works, as well as the families of similar medicines.

Dinamizations lead to a deeper degree of penetration and greater coherence despite the lack of any chemical or even physical structure in the classical sense.

One intriguing aspect of homeopathy’s functionality is the resonance of specific regions or systems of the body with specific groups of information within an appropriate solute; it is believed that this means that the biological body is also quantum-mechanical, *i.e.*, it is proposed the existence of quantum levels for biological elements.

Should this be true, then these specific regions or systems would bear specific instructional charges (information); they would be like autonomous intelligent units in their specific functionalities, though highly dependent in the integral functionality.

Quantum mechanics has amazing properties which can lead to great reinterpretations of the physical values concerning certain objects. Through it, one might reach results entirely distinct from those obtained through a classical perspective. One might even reach results inconsistent with what we call common sense. In the world of quantum mechanics, common sense becomes radically different and gain absolutely new contours. Obviously it still exists, but does not have the same meaning we are used to attributing to it in our everyday life, anymore: it has to be thoroughly re-examined.

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